

Summary of Sustainable Forestry Research FY 2008

Michigan Department of Natural Resources

Ronald Murray, Editor

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Purpose and Use of this Report

The State of Michigan, under the Michigan Departments of Natural Resources (DNR), Environmental Quality (DEQ), and Agriculture (MDA), supports research projects to ensure sustainable management of Michigan's forest lands. This document summarizes those projects in place during the fiscal year 2008 (October 1, 2007 - September 30, 2008). This document also fulfills the requirement of Forest Certification Work Instruction 5.1 "Coordinated Natural Resource Management Research" for an annual summary of research activities within forested landscapes. This report should be used to document the Michigan's commitment to sustainable forestry research and to inform discussion on research needs and collaboration opportunities in the DNR, DEQ, and MDA.

Research Summaries

Research is administered and supported differently in each Department and DNR Division. The Wildlife Division and Fisheries Division administer all research activities through their respective research sections. These Divisions also have a significant portion of their research efforts funded by a variety of federal grants that have annual reporting requirements. Forest, Mineral and Fire Management Division (FMFMD) does not have a dedicated research section; administration and support of research occurs through each program area.

The summary of research projects are organized into tables by Department and applicable DNR divisions. Each table is then organized by group based upon the objectives of the study. The group names provide a logical link to the themes of sustainable forestry and allow the reader to assess the breadth and depth of the DNR's research programs. One study could potentially fit into multiple groups. For purposes of simplicity, studies are listed in only one group. The group names are:

- Ecological Processes;
- Human Dimensions;
- Chemical Use;
- Forest Management
- Wildlife Management;
- Fisheries Management;
- Environmental Protection;
- Biological Diversity;
- and Social Economic.

Integration and Use of Research in the DNR

Research that supports sustainable forestry in the DNR occurs through a variety of mechanisms. The DNR supports a large number of research projects contracted through multiple universities within the state. The DNR supports university faculty positions through their DNR's Partnership for Ecosystem Research and Management (PERM) program. The DNR also employs its own research and monitoring staff in FMFMD, Wildlife Division, and Fisheries Division.

Michigan DNR research programs cover the entire breadth and depth of sustainable forestry. While each Division uses a different array of means to communicate research findings, the research programs are well integrated with the operations of the DNR and are providing useful information to support improvements in business practices. Division in-service trainings, specialist meetings, and ongoing field and program communications are examples of the means used to convey research information to DNR personnel. For more information about specific research projects listed in the tables above, interested parties should contact the research coordinator for that Division. Table 7 lists the research coordinator for each Division.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES RESEARCH PROJECTS – 2008

Table 1 Forest, Mineral, and Fire Management Division

FY 2008 Research Funded by DNR-FMFM

Primary Contact for all projects: Ronald Murray, Research Coordinator, Forest, Mineral, & Fire Management Division, 517-335-3353, murrayr@michigan.gov

Forest Management

-Study/Job title/description
Research Agency

-Conduct the re-measurement of the FIA plots for Michigan
Forest Inventory Analysis

- Design, develop, and build prototype and operational equipment units for mechanized forest fire fighting
Forest Fire Experiment Station
- Design and develop specialized equipment for forest fire fighting
Roscommon Equipment Center
- Funding for center to do Tree Improvement Studies and implement nursery practices to improve quality of tree seedlings produced in Michigan State Forest Nurseries
Michigan Tree Improvement Center
- Improvements of production of nursery stock and seedlings
Wyman Nursery Improvement
- Development of a GIS-based inventory system for the Michigan State Forests known as the Integrated Forest Monitoring Assessment and Prescription (IFMAP) system
Michigan Department of Information Technology and Landmark Systems
- Support of a PERM Research Forester's forest-based projects that relate to both forest management and wildlife habitat improvements
Michigan State University –PERM Forester
- Support for research on Seedling, Nursery, & Tree Improvement Projects
MichCoTip and the Aspen-Larch Cooperative
- To develop and implement a statewide beech bark disease monitoring and impact analysis system
University of Michigan
- Oak Wilt Detection Survey-Oak Wilt Sample Analysis for delimitation of infected areas
Michigan Technological University
- Vegetative Management System for timber treatments (VMS)–To develop and implement a computerized timber sale treatment tracking system. *Note this money is the approximate amount that our Technical Staff from another agency other than DNR performed
Michigan Department of Information Technology
- Sirex Trapping to detect and identify Sirex spp. in Michigan
Michigan State University

Ecological Processes

-Natural Features Inventory of the Michigan State Forests & Other Studies of Natural Features

Michigan State University – Michigan Natural Features Inventory

FY 2008 Research Permitted on FMFM-Administered Lands But Not Directly Sponsored

Biological Diversity

- A project to collect and bank seeds for the Millennium Seed Bank Project in an effort to establish a high quality, accurately identified, and well documented native species seed collection at the population level. .

Chicago Botanical Gardens et. al. national partnership

Forest Management

-A project to study the biology and methods of reducing the rate of spread of the Emerald Ash Borer in newly established or low density sites on forested sites.

Michigan State University funded by APHIS PPQ CPHST

-Sirex Woodwasp Monitoring Project-a project to detect Sirex using herbicided trap trees

Michigan Technological University

-A study entitled "Interactions Among Prescribed Fire, Mechanical Treatments, Insect Pests and Pathogens in Red Pine" seeks to 1) Determine the effects of fire and mechanical treatments, alone and in combination, on incidence and impact of forest insect pests and pathogens in mature red pine stands in the Lake States. 2) Document the effects of these treatments on forest vegetation and litter parameters, and relate these effects to the biology of forest pests.

Michigan Technological University and USDA=FS, S&PF

-“Impact of the Sleeper Lake Wildfire on Forest Health in Upland Pine Forests.”

This study is related to the Muskrat Lakes Fire and Fire Surrogate study and is taking place in and around the Sleeper Lake Wildfire site in Luce County.

Permanent plots have been established to monitor tree response to fire.

Understory vegetative response is also being measured. Forest health data was collected including fire severity and insect activity.

Michigan Technological University

-Causes of Ash Decline in Michigan are being studied to determine their role in the mortality of ash and their relationship to the Emerald Ash Borer mortality now being experienced across the state.

Michigan State University

Ecological Processes

-The Michigan Gradient study conducts research on Nitrogen gradients to understand the mechanisms controlling carbon © and N cycling in the face of chronic N deposition and the long-term consequences of N saturation

Michigan Technological University with support from the National Science Foundation

Wildlife Management

-A study of small mammal biology is being done by trapping small mammals on state lands

University of Michigan Museum of Zoology

Table 2 Parks and Recreation Division

FY 2008 Research Funded by DNR-PRD

Primary Contact for all projects: Glenn Palmgren, Research Coordinator, Parks & Recreation Division, 517-373-7844, PalmgrenG@michigan.gov

-Study/Job title/description

Research Agency

Ecological Processes

- An Inventory of Pinckney and Waterloo Recreation Areas to Identify Significant Aquatic Natural Features

Michigan Natural Features Inventory

FY 2008 Research Permitted on PRD-Administered Lands But Not Directly Sponsored

Ecological Processes

- A Study of Dune 1 (the Homestead Trail Parabolic Dune) in Hoffmaster State Park

Calvin College

- Ecological impacts of Emerald Ash Borer on Michigan state lands

Ohio State University

- Establishment of a diverse assemblage of native grasses & forbs on a degraded, knapweed infested site in Bass River RA, Ottawa Co, MI

Grand Valley State University

- Impacts of Emerald Ash Borer mortality on amphibian community diversity in southeastern Michigan
Wayne State University
- Photogrammetric measurement of sand dune erosion at P.J. Hoffmaster and Saugatuck Dunes State Parks
Hope College
- Soil environment and its effects on replanted plant performance
Michigan State University
- Soil sampling in successive dune ridges to determine composition and structure of microbial communities in soils
Mississippi State University
- Study of beach-coastal dune processes
Calvin College
- The effect of windblown sand on atmospheric electric field
University of Michigan

Human Dimensions

- Tick and Lyme Disease research
Michigan State University
- Tick sampling for Lyme Disease monitoring
MI Dept of Community Health

Forest Management

- Calibration of GLO survey data using modern data in unlogged old growth forests
University of California-Davis
- Examination of White Pine's survival in a non-flammable forest
University of Wisconsin-Madison
- Shifts in understory dynamics of Eastern Hemlock stands due to nitrogen deposition by White-tailed Deer
Michigan Technological University

Wildlife Management

- Assessing an expert-based landscape approach to predict King Rail (*Rallus elegans*) distribution
University of Arkansas
- Deer densities in hemlock stands in Porcupine Mountains Wilderness State Park
Michigan Technological University

Environmental Protection

- A study of techniques for control of Emerald Ash Borer
Michigan State University
- Assessment and control of Sea Lamprey
US Fish & Wildlife Service-Ludington
- Bark beetle early detection and rapid response survey
Michigan State University
- Beech Scale spread rate: Beech Bark Disease research
Michigan State University
- Cooperative weed control within Michigan State Parks (Baby's breath survey and eradication)
The Nature Conservancy in Michigan
- Exotic insect detection in Michigan State Parks, Recreation Areas and State Game Areas
USDA
- Expanded biological control of the Emerald Ash Borer (release of 2 parasitoids)
USDA Forest Service
- Michigan Technological University Emerald Ash Borer Projects (survey and detection) on State Lands
Michigan Technological University
- Release parasitoids of the Emerald Ash Borer on Michigan state land
USDA-APHIS

Biological Diversity

- A study of reclamation efforts at Manley-Peters Sand Mine in Grand Mere State Park
Hillsdale College
- A study of the natural selection on floral traits of three species of milkweed
Michigan State University
- A study of the population genetics of Rose Pink in Michigan and nearby states
Albion College
- Censusing lianas in mesic biomes of the eastern regions
University of Michigan Museum of Paleontology
- Distribution and genetic characteristics of Michigan Switchgrass
Michigan State University
- Evolution and biogeography of the *Solidago simplex* species complex
University of Michigan-Ann Arbor
- Impact of reservoirs on food webs downstream from dams on the Kalamazoo River

Michigan State University

- Integrating long-term demographic data & repeated genetic sampling for viability analysis of natural & restored populations of Pitcher's Thistle

East Carolina University

- Moth collection and documentation in Berrien County

Michigan State University

- Phylogenetic relationships and signal evolution in fireflies

University of Georgia

- Proper establishment of Beach Pea seedlings

Indiana Dunes National Lakeshore

- The distribution and ecological associations of lianas and herbaceous vines in the eastern deciduous forest/prairie transition zone

US Geological Survey

Table 3 **Wildlife Division** **RESEARCH PROJECTS – 2008**

Primary Contact for all projects: Patrick Lederle, Research Coordinator, Wildlife Division, 517-373-9338, LEDERLEP@michigan.gov

Ecological Process

- Importance of Coarse Woody Debris to Forest Songbirds
Michigan Natural Features Inventory
- Examining the structure and productivity of avian and vegetative grassland communities in Michigan CREP lands
Michigan State University
- Coastal Wetlands in MI: 1) Effect of isolation on *Phragmites communis* expansion and use by wetland birds, 2) Effect of wetland isolation via dike construction on avian communities using Great Lakes wetlands
Michigan Natural Features Inventory
- Gray Wolf Population Modeling and Estimation Techniques
Michigan Technological University
- Winter use by White-tailed Deer of Remnant Hemlock Stands in the Western Upper Peninsula
Michigan Technological University
- Partners in Ecosystem Research and Management - several projects
Michigan State University

Human Dimensions

- Reducing Partial Controllability: an assessment of TB management intervention
Michigan State University

Biological Diversity

- Bat community along Black Creek, Lenawee County, with emphasis on evening bat and Indiana bat
Eastern Michigan University
- Ecology and conservation of eastern fox snakes in SE Michigan
Michigan Natural Features Inventory
- Modeling the Cumulative Effects of Aspen Management Practices on Wildlife Species, Communities, and Habitat Suitability at Multiple Spatial Scales
Michigan State University
- Developing a Sharp-tailed Grouse Monitoring Program in the Eastern Upper Peninsula
Michigan Technological University
- Effectiveness of Residual Structure Retention in Clearcut Harvest Units for Conserving Biodiversity and Wildlife Habitat
Michigan State University

Social and Economic

- Refining wildlife habitat models for land use support decisions
Michigan State University
- Statewide Analysis and Surveys to Develop an Approach for Identifying Priority Conservation Areas in Michigan
Michigan Natural Features Inventory
- Systematic Evaluation of Oak Regeneration in Lower Michigan
Michigan Natural Features Inventory
- Landscape Ecology of White-tailed Deer in Agro-Forest Ecosystems: A Cooperative Approach to Support Management (Multi-State Project, Michigan Component)
Michigan State University

Table 4
Fisheries Division
Fisheries Division Research Projects funded in FY2008

Primary Contact for all projects: Tammy Newcomb, Research Coordinator,
Fisheries Division, 517-373-3960 NEWCOMBT@michigan.gov

-Study/Job title/description (Fisheries Division Assessment Theme**) *Principal Investigator (Agency)*

****Fisheries Division Assessment Themes**

- Inland lakes and depressional wetlands (ILDW)
- Rivers, streams, and floodplain wetlands (RSFW)
- Great Lakes nearshore zones, including coastal wetlands (GLNSZ)
- Great Lakes deepwater zones (GLDWZ)
- Great Lakes pelagic zones (GLPZ)
- Fish culture and fish health (FCFH)
- Human dimensions of aquatic systems and their fisheries (HD)

Ecological Processes

-Towards comprehensive databases and coordinated fish surveys for ecosystem management in the Great Lakes (Multiple)

Adlerstein (University of Michigan)

-Quantifying the effects of anthropogenic development on lake food webs (ILDW)

Bremigan (Michigan State University)

-Northern Lake Huron, Coolwater Fish Community Assessment (GLNSZ)

Fielder (MDNR, Fisheries Division)

-Fish community status in Saginaw Bay, Lake Huron (GLNSZ)

Fielder (MDNR, Fisheries Division)

-Lakewide assessment of the contribution of natural recruitment to the Chinook salmon population of Lake Huron (GLPZ)

Johnson (MDNR, Fisheries Division)

-Colonization of a brook trout stream by introduced brown trout (RSFW)

Nuhfer (MDNR, Fisheries Division)

-Evaluation of brown trout and steelhead competitive interactions in Hunt Creek, Michigan (RSFW)

Nuhfer (MDNR, Fisheries Division)

- Evaluation of lake sturgeon populations in the St Clair River and Lake St Clair, Michigan (GLNSZ)

Thomas (MDNR, Fisheries Division)

- Effects of Piscirickettsia infection on the muskellunge population of Lake St. Clair (FCFH)

Thomas (MDNR, Fisheries Division)

- Evaluation of in-stream habitat improvement in a southwest Michigan trout stream (RSFW)

Wills (MDNR, Fisheries Division)

- Effects of sediment traps on Michigan river channels (RSFW)

Wills (MDNR, Fisheries Division)

- Influence of lotic and nearshore habitats on fish populations in Great Lakes and inland lake ecosystems, with emphasis on walleye (Multiple)

Zorn (MDNR, Fisheries Division)

- Effects of environmental and anthropogenic factors on recruitment and apportionment of phenotypic and genetic diversity of fish populations in inland and Great Lakes habitats (Multiple)

Scribner (Michigan State University)

Human Dimensions

- Michigan Statewide Angler Survey Program (Multiple)

Clapp/Su (MDNR, Fisheries Division)

- A statewide survey of Michigan's licensed anglers (HD)

Lupi (Michigan State University)

- Comprehensive analysis and improvement of Michigan statewide angler survey data

Su (MDNR, Fisheries Division)

Fisheries Management

- Improving fishery stock assessments in the Great Lakes (Multiple)

Bence (Michigan State University)

- The importance of trophic interactions for salmonine fisheries of the Great Lakes (GLPZ)

Bence (Michigan State University)

- Energetics approach to predicting growth, maturation, and fecundity of largemouth bass, bluegill, and walleye (ILDW)

Breck (MDNR, Fisheries Division)

- Pond rearing of juvenile lake sturgeon (FCFH)

Breck (MDNR, Fisheries Division)

- Decision-support tools for managing fisheries of inland lakes (ILDW)

Breck (MDNR, Fisheries Division)

- Statewide coded-wire tagging and tag recovery program (Multiple)

Clapp (MDNR, Fisheries Division)

- Population dynamics of yellow perch stocks in Michigan waters of Lake Michigan (GLNSZ)

Clapp (MDNR, Fisheries Division)

- Assessment of Chinook salmon and coho salmon populations and their prey in Eastern Lake Michigan (GLPZ)

Claramunt (MDNR, Fisheries Division)

- Evaluation of returns of salmonids to weirs in Michigan's waters of the Great Lakes (GLPZ)

Claramunt/Jonas (MDNR, Fisheries Division)

- Vital statistics of walleye in Saginaw Bay (GLNSZ)

Fielder (MDNR, Fisheries Division)

- Dynamics of the Lake Erie walleye and yellow perch populations and fisheries (GLNSZ)

Haas (MDNR, Fisheries Division)

- Fisheries assessments in large, inland lakes of Michigan (ILDW)

Hanchin (MDNR, Fisheries Division)

- Design, analysis, and implementation of aquatic resource inventory in Michigan (Multiple)

Hayes (Michigan State University)

- Implications of lakeshore development for fishery resources in Michigan (ILDW)

Hayes (Michigan State University)

- Evaluation of lake trout stocks in Lake Huron (GLDWZ)

He (MDNR, Fisheries Division)

- Assessment of predator-prey balance for Lake Huron fishery management (Multiple)

He (MDNR, Fisheries Division)

- Comparison of the recreational fisheries produced by stocking of spring and fall yearling brown trout, Lake Huron (Multiple)

Johnson (MDNR, Fisheries Division)

- Assessment of lake trout populations in Michigan's waters of Lake Michigan (GLDWZ)

Jonas (MDNR, Fisheries Division)

- Performance, survival and production of steelhead strains in tributaries of Lake Michigan (Multiple)

Jonas (MDNR, Fisheries Division)

- Influence of total length and condition at stocking on Chinook salmon survival and time at large (GLPZ)

Jonas (MDNR, Fisheries Division)

- Evaluation of the relative growth and survival of Assinica, Nipigon, and Iron River-strain brook trout stocked into small inland lakes (ILDW)

Nuhfer (MDNR, Fisheries Division)

- Effects of restrictive minimum size limits and gear restrictions on brook trout populations in the Black River, Michigan (RSFW)

Nuhfer (MDNR, Fisheries Division)

- Evaluation of Eagle Lake and steelhead-strain rainbow trout stocked into inland lakes in Michigan (ILDW)

Nuhfer (MDNR, Fisheries Division)

- Effects of exploitation and fisheries management on genetic diversity of fish stocks in inland and Great Lakes waters of Michigan (Multiple)

Scribner (Michigan State University)

- Assessment of lake trout populations in Michigan waters of Lake Superior (GLDWZ)

Sitar (MDNR, Fisheries Division)

- Status of Lake St Clair fish community and sport fishery (GLNSZ)

Thomas (MDNR, Fisheries Division)

- Charter boat catch and effort from the Michigan waters of the Great Lakes (Multiple)

Wesander (MDNR, Fisheries Division)

- Continued monitoring of yellow perch and walleye populations in Michigan waters of Green Bay, Lake Michigan (GLNSZ)

Zorn (MDNR, Fisheries Division)

- Assessing the effects of spring fishing regulations on reproductive dynamics and population demographics of black bass in Michigan lakes (ILDW)

Bremigan (Michigan State University)

- Hooking mortality of lake trout in the upper Great Lakes (GLDWZ)

Sitar (MDNR, Fisheries Division)

- Development of databases, classification systems, and fisheries management tools for inland lakes of Michigan (ILDW)

Wang (MDNR, Fisheries Division)

- Compare and improve lake trout abundance indices and evaluate optimal allocation of creel survey resource for Lake Huron (Multiple)

Su (MDNR, Fisheries Division)

- Surveillance of wild and feral fish species susceptible to viral hemorrhagic septicemia / VHS (FCFH)

Whelan (MDNR, Fisheries Division)

- Collection of fall spawning lake trout for contaminant analysis (FCFH)

Clapp / Johnson (MDNR, Fisheries Division)

Biological Diversity

- Improve and validate river segment identification and classification models for assessing fishery potential and environmental impairment in Michigan (RSFW)

Wang (MDNR, Fisheries Division)

- Status and trends of inland lakes: methods development, program oversight, and ecological assessment (ILDW)

Wehrly (MDNR, Fisheries Division)

- Status and trends of fish populations and community structure in Michigan streams (RSFW)

Wills/Nuhfer (MDNR, Fisheries Division)

- Patterns in community structure, life histories, and ecological distributions of fishes in Michigan rivers (RSFW)

Zorn (MDNR, Fisheries Division)

- Lake sturgeon population status in the Cheboygan River watershed lakes, Michigan (ILDW)

Baker (MDNR, Fisheries Division)

- Lake sturgeon rehabilitation using stream-side rearing (FCFH)

Baker (MDNR, Fisheries Division)

-Fisheries resource river assessments (Multiple)

Hay-Chmielewski (MDNR, Fisheries Division)

Table 5. DNR Research Coordinators.

DNR Division	Coordinator	Phone number	Email
FMFMD	Ronald Murray	517-335-3353	MurrayR@Michigan.gov
PRD	Glenn Palmgren	517-373-7844	PalmgrenG@michigan.gov
Wildlife	Patrick Lederle	517-373-9338	LederleP@Michigan.gov
Fisheries	Tammy Newcomb	517-373-3960	NEWCOMBT@michigan.gov